

**REMARKS**

Independent claim 1 has been amended to recite the limitations of dependent claims 8, 23, 24, 26, and 28, which are canceled.

Independent claim 34 has been amended to recite an “optical interference unit,” as is recited in claim 1, and to recite the limitations of dependent claims 48 and 49, which are canceled.

Independent claim 51 has been amended to recite that the optical interference unit comprises “helical organic molecules each having a target capturing body bonded thereto, and said helical organic molecules being aligned to form a film-like material,” as recited in original claims 23, 24, 26 and 28.

Other amendments have been made to the claims for clarity and grammatical correction.

No new matter has been introduced.

After entry of this Amendment, claims 1-7, 9-22, 25, 27, 29-47, and 50-53 will be pending in the application.

As defined by amended claim 1, the present invention is a target detection apparatus which comprises:

(1) an optical irradiation unit which irradiates light;

(2) an optical interference unit comprising helical organic

molecules each having a target capturing body bonded thereto, the helical organic molecules being aligned to form a film like material, wherein the optical interference unit is capable of: interacting with a detection target,

interfering with the light irradiated from the optical irradiation unit,  
radiating said light as interference light, and varying the wavelength of the  
interference light after interaction with the detection target, and

(3) a wavelength change detecting unit placed in the path of the  
interference light which detects the wavelength variation of the  
interference light radiated by the optical interference unit.

The present invention therefore provides a target detecting apparatus (independent claim 1), a target detection substrate (independent claim 34), and a target detecting method (independent claim 51), which can detect various detection targets such as pathogens, biological substances and toxic substances with a reduced measurement error, together with high efficiency, simplicity, speed and sensitivity, and without a costly measurement apparatus.

#### **I. Priority Claim**

Applicants appreciate the Examiner's acknowledgement of the foreign priority claim.

However, page 2 of the Office Action states: "The certified copy has been filed in parent Application No. 2002-362706."

Since Application No. 2002-362706 is the priority application, to avoid any ambiguities that could later arise, the Examiner is kindly requested to confirm that the certified copy has been received in the present application.

#### **II. Information Disclosure Statement**

The Examiner's consideration of the Information Disclosure Statements filed March 25, 2004 and August 15, 2005 is appreciated.

However, sheet 4 of the March 15, 2004 PTO/SB/08 was inadvertently not signed.

The Examiner is kindly requested to sign sheet 4 to indicate that such was considered.

For the Examiner's convenience, a copy of sheet 4 of the March 15, 2004 PTO/SB/08 is attached to this Amendment.

### **III. Response to Objections to the Drawings and Specification**

(1) At page 2 of the Office Action, the Examiner objects to Figure 18 for not indicating the identity of the solid, dashed, and bold lines.

The description of Figure 18, at page 8 of the specification, has been amended accordingly. These amendments are supported by the paragraph bridging pages 59 and 60.

(2) At page 4 of the Office Action, the Examiner objects to the disclosure for not disclosing the identity of reference characters 2 and 10c in Figures 13-15.

The specification has been amended to insert the reference characters. Specifically, at page 59, line 5, "10c" has been inserted after the word "biotin," and "1" has been inserted after "avidin."

In addition, reference character "2" is a non-target molecule, as is clear from FIGS. 14 and 15 wherein molecules labeled as "2" are not captured. Thus, page 59, lines 6 and 7, have been amended to indicate that: "FIG. 14 is a schematic diagram showing the state where the optical interference unit is immersed in the aqueous solution of avidin and non-target molecules."

Withdrawal of these objections is respectfully requested.

**IV. Response to Objections to the Claims**

At page 4 of the Office Action, the Examiner objects to claims 7, 27, 28 and 53.

(1) With respect to claim 7, the Examiner states that the phrase “radiates interference light at least one” should more appropriately be “radiates interference light as at least one.”

Applicants agree. Claim 7 has been amended accordingly.

(2) With respect to claims 27 and 28, the Examiner states that the language “the target detection part” is not consistent with claim 26.

Claim 27 has been amended to recite “a target capturing body” as supported by the specification at page 28. Claims 26 and 28 have been canceled.

(3) With respect to claim 53, some changes to the language were requested for clarity.

Claim 53 has been amended to clarify the subject matter thereof.

Withdrawal of these objections is respectfully requested.

**V. Response to Claim Rejections Under 35 U.S.C. § 102(b)**

At page 5 of the Office Action, claims 1-3, 7-9, 12-21, 34-36, 38-46 and 51-53 are rejected under 35 USC §102(b) as being anticipated by Kawaguchi et al., *Thin Solid Films* 91:369-381 (1990).

Independent claim 1 has been amended to recite the limitations of dependent claim 24, which are not rejected as anticipated by Kawaguchi. Specifically, amended claim 1 recites that the optical interference unit comprises “a helical organic molecule with a target capturing body bound thereto.”

Independent claim 34 has been amended to recite the limitations of dependent claim 49, which are not rejected over Kawaguchi. Specifically, amended claim 34 recites that the film-like material is formed from helical organic molecules each having a target capturing body bound thereto.

Independent claim 51 has also been amended to recite that the optical interference unit comprises helical organic molecules each having a target capturing body bound thereto.

Kawaguchi discloses a device for visual detection of antigens and antibodies. The device of Kawaguchi is composed of a light reflecting substrate, a light-interference layer and an immobilized antibody layer (see Fig. 3 of Kawaguchi). While the antibody layer of Kawaguchi includes lipid molecules (barium stearate and methyl arachidate) and antibodies, Kawaguchi does not disclose, or suggest, a layer of a *helical* organic molecule *having a target capturing body bonded thereto*, as recited in the present claims.

Since Kawaguchi does not disclose all the elements of the amended claims, Kawaguchi does not anticipate the same.

Withdrawal of this rejection is respectfully requested.

#### **VI. Response to Claim Rejection Under 35 U.S.C. § 103(a)**

(1) At page 9 of the Office Action, claims 4-6 are rejected under 35 USC §103(a) as being obvious over Kawaguchi et al.

Independent claim 1, from which claims 4-6 depend, has been amended to recite an optical interference unit comprising helical organic molecules each having a target capturing

body bound thereto. Since Kawaguchi does not teach or suggest these features of the present invention, Kawaguchi does not render claims 4-6 *prima facie* obvious.

(2) At page 10 of the Office Action, claims 10, 11, 22-30, 37 and 47-50 are rejected under 35 USC §103(a) as being obvious over Kawaguchi et al, as applied above, in view of Kinoshita, "Preparation of Structural Color Forming System by Polypeptide-Based LB Films" (March 14, 2001).

Specifically, the Examiner acknowledges that Kawaguchi does not disclose a rod-shaped material in the film. However, the Examiner contends that Kinoshita teaches an apparatus that detects interference color and that employs a film of rod-like polymers on a substrate.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the present invention was made to use the rod-like polymers of Kinoshita with the apparatus of Kawaguchi.

The present invention as defined by the amended claims involves a film of rod-shaped organic molecules each having a target capturing body bound thereto.

While Kawaguchi teaches films consisting of lipid molecules (barium stearate and methyl arachidate) and antibodies, and while Kinoshita teaches an apparatus that employs a film of rod-like polymers on a substrate, neither Kawaguchi nor Kinoshita teach or suggest a film of helical organic molecules each having a target capturing body bonded thereto.

Accordingly, the present claims are non-obvious over Kawaguchi and Kinoshita. Withdrawal of this rejection is therefore requested.

(3) Claims 32 and 33 are rejected under 35 USC §103(a), as being obvious over Kawaguchi, as applied above, in view of U.S. Patent 6,392,756 to Li et al.

Specifically, the Examiner acknowledges that Kawaguchi does not teach a laser irradiation device or a device that can irradiate a pencil light beam. However, the Examiner asserts that Kawaguchi's device measures interference color changes that are responsive to increases in layer thickness as a result of antigen-antibody interactions.

The Examiner contends that Li et al. teach a device that determines physical parameters such as thickness of thin films deposited on a substrate, and employs a tunable laser source as the optical radiation unit.

The Examiner believes that it would have been obvious to one of ordinary skill in the art at the time the present invention was made to utilize the tunable laser source of Li with the device of Kawaguchi, in order to produce stable light of a set wavelength range for detection of the interference colors of the layer.

As with Kawaguchi and Kinoshita, Li et al. also do not teach bonding a target capturing body to a helical organic molecule forming a film. Accordingly, Kawaguchi and Li, either alone or in combination, do not render the present invention *prima facie* obvious.

## **VII. Conclusion**

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Amendment under 37 C.F.R. § 1.111  
USSN 10/733,450

Attorney Docket Q78911

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

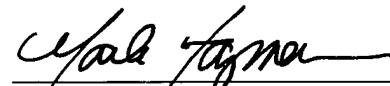
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**23373**

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Date: April 5, 2006